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R & D Department

ACHESON COLLOIDS COMPANY

Port Huron, Michigan

Project CPD-A-56

MONTHLY REPORT #2

Covering Period from

November 1 to November 30, 1959

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December 7, 1959

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[redacted]

[redacted]

SPECIAL A B C DISPERSION

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I. SUMMARY

The work done so far on dispersion of lead in epoxy resin looks very encouraging. The particle size of the lead is small, and the dispersion in resin does not have severe flocculating tendencies. As soon as the material is available we will begin work on dispersing the uranium dioxide. This should occur sometime in December.

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II INTRODUCTION

This report covers work being done at ACC on the making of a dispersion of lead (A) and uranium dioxide (B) in epoxy resin (C). The main object is to provide a superior dispersion of the two materials in the resin, with no agglomeration and with uniform density. This is to yield a superior material when hardened.

A portion of our laboratories has been set aside for the work. The personnel involved in the project have been warned of the security requirement and the radiation hazards involved. The needed equipment is now located in the project area and work has begun on the investigation of dispersion of lead in the resin system. We are having a small drybox constructed by our shop and protective clothing is on order so that when the UO_2 arrives we will be ready to begin work with it.

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III Procedures and Results

During November the first active work was done on this project. As a first step, Mr. Campbell examined microscopically the various lead powders and dispersions which we had obtained to see which was the finest. For Acheson Colloids Limited, Product 1331, lead in toluene, he obtained the following data:

Maximum	49 microns
Several	21-42 microns
Many	7.0-14 microns
Numerous	3.5-5.6 microns
Balance below	1.4 microns (not many fines)

For Spelthorne Metallic Lead Pigment in Aroclor, he found the following:

Maximum	28 microns
Several	14-21 microns
Numerous	3.5-7.0 microns
Majority below	1.2 microns

For Metalead Products Corporation Superfine S Powder rubbed out on a plate with epoxy resin 828, he obtained:

Maximum	9.0 microns
Several	5.6-7.0 microns
Numerous	2.1-4.9 microns
Majority below	1.4 microns (many spherical particles)

This work indicates that the Metalead product is certainly the finest of the three for use in this project. Also the rubout of the powder showed that a good dispersion, of the lead at least, should be possible in the 828 epoxy. This is not always the case, since dispersing agents sometimes are required in large amounts. It is our opinion, having seen the lead, that little particle reduction will be possible in this system. Particle classification is always a possibility, however, and it may be feasible to eliminate all particles of lead over 4.9 microns in diameter by settling or centrifuging. This will be attempted if deemed necessary.

After this examination, it was decided to attempt to disperse the lead in the epoxy by using our Eppenbach Homo-Mixer. This is a high speed mixer-homogenizer employing metal to metal shear in addition to the fluid to fluid shear of the Cowles Dissolver. It was evident from the first test that this method of dispersing has good possibilities. A mix of all the lead plus all the epoxy of the system was thin enough to be worked in the Homo-Mixer. The resulting

dispersion was thinned down with more epoxy resin and showed the following appearance:

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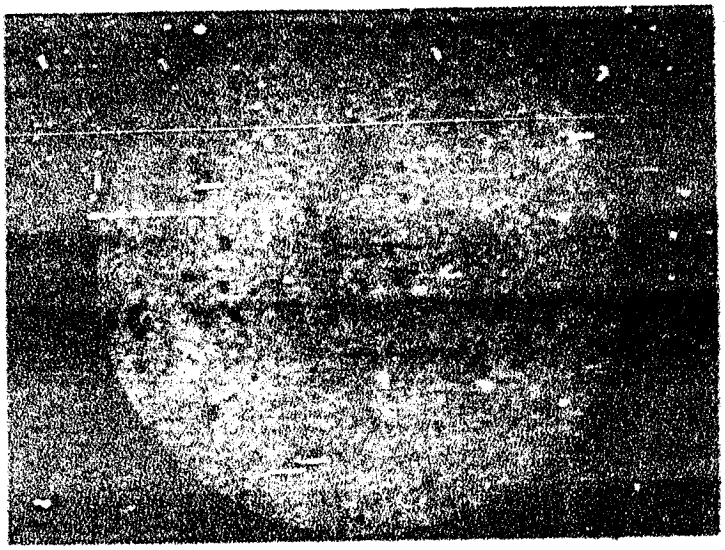

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It should be noted that one major division on the reticule is 10 microns, thus, although there appears to be a few agglomerates present, only a few of them are over 10 microns in diameter. It was also noted in examination that the light or heat of the microscope seemed to promote the formation of agglomerates. This may indicate the need for some dispersing agent after all, since curing will involve heat.

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IV DISCUSSION

During December work will continue on the investigation of lead dispersal in 828 epoxy. This product will be put through the molding cycle so as to obtain finished disks. It is felt that it will be best to thoroughly examine this system before we start to study the uranium dioxide dispersion with the needed handling precaution.

Mention has been previously made that we may wish to make two base dispersions, one of lead and one of uranium dioxide. These will then be admixed immediately prior to molding. If this looks promising, we may in the future furnish these base dispersions to Livermore for trial in their present molding procedure. We hope that it will be possible to arrive at a process which will eliminate the need for vacuum molding.

V APPROXIMATE COSTS PER MONTH

To the end of November we spent approximately 38 staff hours on Project A-66. The November work will be billed in January. For October we have arrived at a project cost of $167.30 for which we are currently billing. Also, we are partially billing for the cost of moving the equipment, and space rental. In the future there will continue to be a one-month lag in billing since monthly cost records are normally not available until the 15th of the month following.

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